

### Trend Study 30-54-03

Study site name: Bullion Canyon.

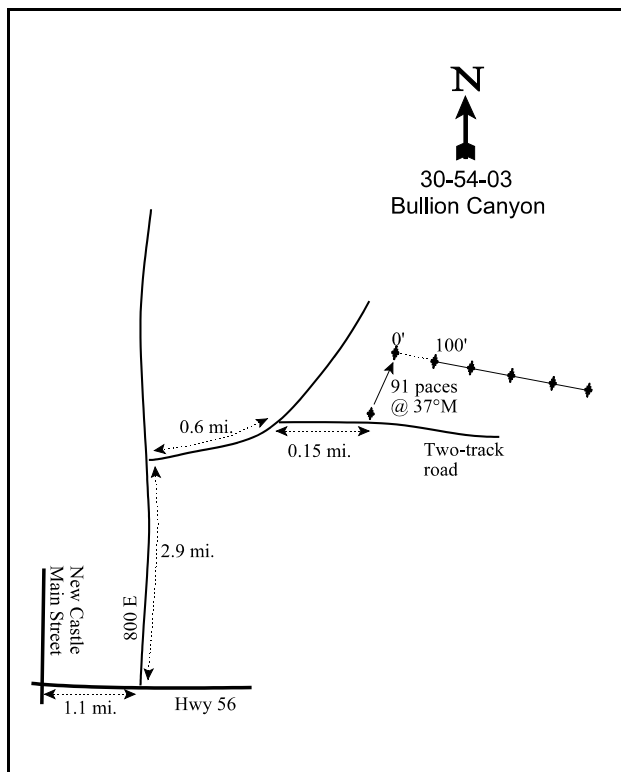
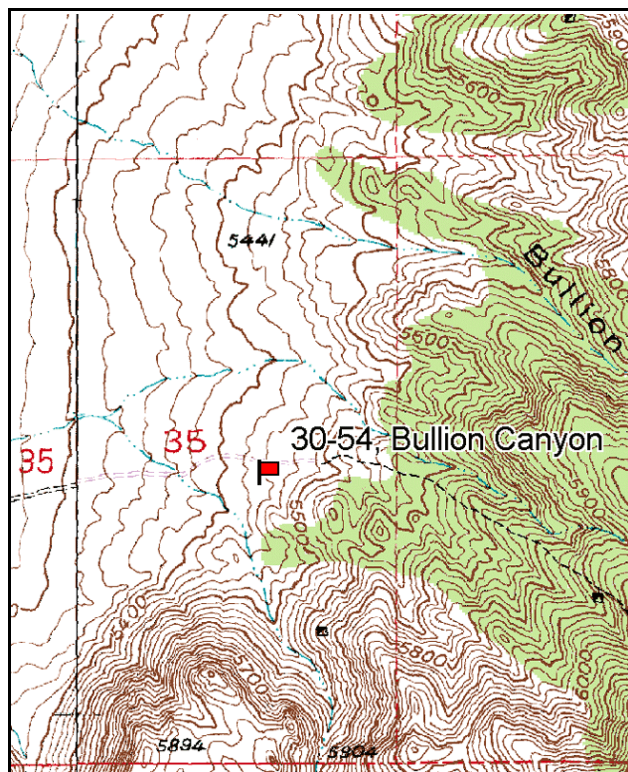
Vegetation type: Wyoming Big Sagebrush.

Compass bearing : frequency baseline 97 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

#### LOCATION DESCRIPTION

Starting at the intersection of Hwy 56 and Main street in New Castle, head east on Hwy 56 1.1 miles to 800 E. Turn left (north) onto 800 E. and drive 2.9 miles to a right turn (0.3 miles past a gate). Go 0.6 miles to a fork. Take the faint two-track road to the right and go 0.15 miles to a witness post on the left side of the road. The 0-foot stake is 91 paces at 37 degrees magnetic from the witness post. The 0-foot stake is marked by browse tag #493. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.



Map name: Silver Peak

Diagrammatic Sketch

Township 35S, Range 15W, Section 35

GPS: NAD 27, UTM 12S 4176790 N, 280124 E

## DISCUSSION

### Bullion Canyon - Trend Study No. 30-54

This trend study is located near the mouth of Bullion Canyon. It was established in 1998 and samples a sagebrush-grass range type within a scattered population of juniper trees. Slope varies from 5% to 10% near the bottom of the hill, to 25% at the end of the baseline. Aspect is to the west and elevation is approximately 5,400 feet. Agricultural fields are located in the valley bottom about 1½ miles to the west. Pellet group data from 1998 estimated light deer use at 23 deer days use/acre (57 ddu/ha). Some of the deer pellet groups were recent and bedding sites were present under several highlined juniper trees. A few old cattle pats were also encountered along with some horse sign. Pellet group data from 2003 estimated a higher level of use at 50 deer days use/acre (124 ddu/ha). About 80% of the pellet groups were from winter use while the other 20% were from spring.

Soil on the site is deep with an effective rooting depth estimated at 19 inches. Rock and gravel are abundant on the surface and within the profile. Soil texture is a loam which is neutral in reaction (pH 7.0). Phosphorus is low at only 6.4 ppm. Ten ppm is considered a minimum value for normal plant development. Protective ground cover consists mostly of rock and pavement cover and sagebrush crowns. Litter cover is lacking and percent bare ground was relatively high at 20% in 1998. There are some active gullies in the area. The upper hillside is terraced with some localized erosion occurring, but it does not appear to be excessive. The soil erosion condition class was determined to be slight in 2003.

The key browse species consist of a combination of black sagebrush and Wyoming big sagebrush. These species appear to be hybridizing with many shrubs displaying phenotypes of both black and Wyoming big sagebrush. All sagebrush has been lumped together as Wyoming big sagebrush. The population density of sagebrush was estimated at 6,420 plants/acre in 1998. Use was moderate, vigor normal on most plants, and percent decadence was low at 17%. Young recruitment was good with 13% of the population consisting of young plants. Data from 2003 show a 18% decline in sagebrush density. Use was classified as moderate to heavy. Due to drought, average vigor has declined and the number of decadent plants increased from 17% in 1998 to 54% in 2003. In addition, 53% of the decadent plants sampled were classified as dying which represents 1,500 plants/acre. Young recruitment is fair but not nearly enough to replace decadent/dying plants.

Other preferred species found on the site in small numbers include fourwing saltbush, green ephedra, and rubber rabbitbrush. Fourwing is scattered over the site, although it occurs in a dense patch near the baseline. Use was moderate and vigor poor on one-third of the plants sampled in 1998. Percent decadence was also high at 43%. Drought conditions also caused downward trends on fourwing. All plants sampled in 2003 were classified as decadent and 75% of those appeared to be dying. The green ephedra appears to be fairing better. They showed heavy use in 1998 and moderate to heavy use in 2003. Density increased 31% in 2003 to 840 plants/acre. Average vigor is still poor on nearly one-third of the population although the number of decadent plants declined to only 19%.

Increaser shrubs include narrowleaf low rabbitbrush and broom snakeweed. Snakeweed was the most abundant increaser in 1998 with an estimated density of 1,360 plants/acre. Age class distribution indicated a slightly expanding population. Due to drought, the population declined 59% in 2003 to only 560 plants/acre. Singleleaf pinyon and Utah juniper trees are scattered over the site. Point-quarter data from 1998 estimated 21 pinyon and 96 juniper trees/acre. Average basal diameter was 1.6 inches for pinyon and 1.9 inches for juniper. Many of the larger, older trees appeared to be highlined. Tree density has slowly increased. Point-quarter data from 2003 estimated 29 pinyon and 157 juniper trees/acre. Average diameter has remained similar (1.7" for pinyon and 1.7" for juniper). Size class analysis indicates that 40% of the trees sampled were young trees in the 1-4 foot class and another 25% were seedlings.

The herbaceous understory is poor. Grasses were dominated by the annual cheatgrass which provided 76% of the herbaceous cover in 1998. With drought, cover of cheatgrass declined and provided only 1% of the total grass cover in 2003. Perennial species are not abundant with only the warm season grass, galleta, occurring more than occasionally. Forbs are diverse, but produced less than 1% cover in 1998 and 2003. The most common species is longleaf phlox and spring parsley.

#### 1998 APPARENT TREND ASSESSMENT

The soil trend appears stable but in poor condition. There is a considerable amount of protective ground cover, although most of this comes from rock and pavement. The presence of this type of ground cover can accelerate runoff on moderate slopes. The site is terraced and erosion currently appears localized. Trend for browse appears to be slightly downward for the key species, Wyoming big sagebrush, which makes up 74% of the browse cover. Use is moderate and reproduction does not appear to be adequate to maintain the population. The less abundant fourwing saltbush and green ephedra appear to be declining due to heavy use and poor reproduction. The herbaceous understory is poor with cheatgrass providing almost three-fourths of the herbaceous cover. Several desirable perennial grasses are present, but in small numbers. The forb composition is very diverse for this type of site, although all species occur in low numbers. The herbaceous trend will likely not improve in the future due to the dominance of cheatgrass, combined with the extreme rockiness of the soil surface. Pavement and rock are dark in color which can greatly elevate soil surface temperatures and decrease soil moisture during the summer.

#### 2003 TREND ASSESSMENT

Trend for soil is stable. Average cover for vegetation declined due primarily to the major decline in cover of cheatgrass. Litter cover increased and cover of bare ground declined slightly. The ratio of protective ground cover to bare ground is marginal and some erosion is occurring on the site. The soil erosion condition class was determined to be slight in 2003. Trend for the key browse species, Wyoming big sagebrush, is down due to drought. Density has declined by 18% since 1998, poor vigor has increased, and the number of decadent plants has increased from 17% to 54% of the population. In addition, 53% of the decadent plants sampled were classified as dying (>50% crown death), which amounts to 1,500 plants/acre. No seedlings were sampled in 2003 and young plants accounted for only 6% of the population. The less abundant fourwing saltbush also displayed downward trends. Trend for the herbaceous understory is down slightly. Sum of nested frequency for perennial grasses declined slightly, although average cover of perennials has remained similar to 2003 levels. Drought conditions did cause a significant decline in nested frequency of the annual, cheatgrass. Cover of cheatgrass also declined from 13% in 1998 to less than one tenth of one percent in 2003. All perennial grasses declined in nested frequency but only Sandberg bluegrass and bottlebrush squirreltail declined significantly. Perennial forbs remain rare yet sum of nested frequency has remained stable since 1998.

#### TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --

Management unit 30 , Study no: 54

Type	Species	Nested Frequency		Average Cover %	
		'98	'03	'98	'03
G	Aristida purpurea	1	5	.03	.01
G	Bromus tectorum (a)	<sub>b</sub> 404	<sub>a</sub> 12	12.57	.02
G	Carex spp.	1	-	.00	-
G	Hilaria jamesii	112	96	2.07	2.59
G	Oryzopsis hymenoides	46	29	.95	.52
G	Poa secunda	<sub>b</sub> 22	<sub>a</sub> 7	.46	.05
G	Sitanion hystrix	<sub>b</sub> 40	<sub>a</sub> 2	.38	.01
G	Stipa comata	-	-	-	.00
G	Vulpia octoflora (a)	2	-	.00	-
Total for Annual Grasses		406	12	12.57	0.02
Total for Perennial Grasses		222	139	3.91	3.19
Total for Grasses		628	151	16.48	3.22
F	Allium spp.	2	-	.00	-
F	Arabis spp.	4	2	.00	.01
F	Astragalus spp.	5	-	.01	-
F	Castilleja chromosa	8	-	.09	-
F	Calochortus nuttallii	<sub>a</sub> 5	<sub>b</sub> 29	.01	.09
F	Cirsium spp.	8	-	.04	-
F	Cryptantha spp.	<sub>b</sub> 15	<sub>a</sub> -	.03	-
F	Cymopterus spp.	<sub>a</sub> 17	<sub>b</sub> 28	.07	.07
F	Delphinium nuttallianum	-	6	-	.04
F	Descurainia pinnata (a)	<sub>b</sub> 13	<sub>a</sub> -	.06	-
F	Draba spp. (a)	<sub>b</sub> 24	<sub>a</sub> -	.11	-
F	Eriogonum spp.	8	11	.06	.02
F	Gilia spp. (a)	<sub>b</sub> 10	<sub>a</sub> 4	.06	.00
F	Lithospermum spp.	-	5	-	.18
F	Penstemon spp.	2	-	.01	-
F	Phlox longifolia	48	45	.23	.10
F	Senecio multilobatus	1	-	.03	-
F	Streptanthus cordatus	11	8	.08	.02
Total for Annual Forbs		47	4	0.23	0.00
Total for Perennial Forbs		134	134	0.68	0.54
Total for Forbs		181	138	0.91	0.55

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 30 , Study no: 54

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia tridentata wyomingensis	92	92	19.54	12.57
B	Atriplex canescens	6	4	.97	.21
B	Chrysothamnus viscidiflorus stenophyllus	32	19	.98	.07
B	Ephedra viridis	7	11	.45	.17
B	Gutierrezia sarothrae	18	14	.49	.13
B	Juniperus osteosperma	7	6	1.44	3.44
B	Opuntia spp.	4	9	-	.03
B	Pediocactus simpsonii	3	4	-	-
B	Pinus monophylla	0	0	-	.03
B	Sclerocactus	1	4	-	.00
Total for Browse		170	163	23.89	16.66

CANOPY COVER, LINE INTERCEPT --

Management unit 30 , Study no: 54

Species	Percent Cover	
	'98	'03
Artemisia tridentata wyomingensis	-	7.80
Atriplex canescens	-	.20
Chrysothamnus viscidiflorus stenophyllus	-	.15
Ephedra viridis	-	.05
Juniperus osteosperma	3.40	2.90
Opuntia spp.	-	.16
Sclerocactus	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 30 , Study no: 54

Species	Average leader growth (in)
	'03
Artemisia tridentata wyomingensis	1.0

POINT-QUARTER TREE DATA --  
Management unit 30 , Study no: 54

Species	Trees per Acre	
	'98	'03
Juniperus osteosperma	96	157
Pinus monophylla	-	29

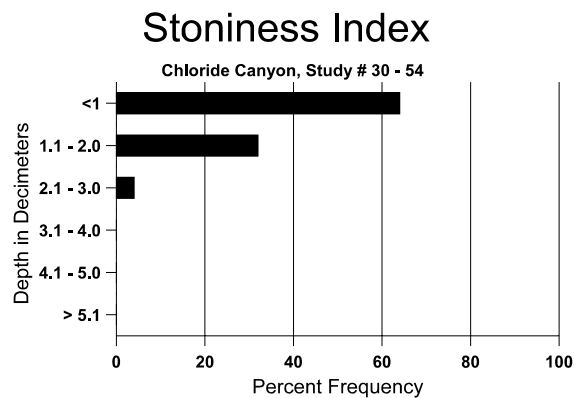
Average diameter (in)	
'98	'03
1.9	1.7
-	1.7

BASIC COVER --  
Management unit 30 , Study no: 54

Cover Type	Average Cover %	
	'98	'03
Vegetation	33.48	21.92
Rock	14.30	16.04
Pavement	33.29	35.88
Litter	12.42	20.07
Cryptogams	.63	.31
Bare Ground	20.05	15.18

SOIL ANALYSIS DATA --  
Management unit 30, Study no: 54, Study Name: Bullion Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
19.0	63.8 (15.8)	7.0	46.0	29.4	24.6	1.7	6.4	160.0	0.6



PELLET GROUP DATA --

Management unit 30 , Study no: 54

Type	Quadrat Frequency		Days use per acre (ha)	
	'98	'03	'98	'03
Rabbit	9	5	-	-
Deer	24	18	23 (57)	50 (124)
Cattle	-	1	2 (5)	-

BROWSE CHARACTERISTICS --

Management unit 30 , Study no: 54

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>											
98	<b>6420</b>	120	860	4460	1100	560	60	9	17	10	12/22
03	<b>5260</b>	-	320	2120	2820	1480	31	16	54	32	9/19
<i>Atriplex canescens</i>											
98	<b>140</b>	-	-	80	60	-	86	0	43	29	21/27
03	<b>80</b>	-	-	-	80	-	0	75	100	75	19/37
<i>Chrysothamnus nauseosus</i>											
98	<b>0</b>	-	-	-	-	-	0	0	-	0	8/18
03	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
<i>Chrysothamnus viscidiflorus stenophyllus</i>											
98	<b>960</b>	60	60	820	80	-	2	0	8	6	10/13
03	<b>480</b>	-	60	120	300	20	8	0	63	38	6/9
<i>Ephedra viridis</i>											
98	<b>580</b>	-	20	360	200	20	14	83	34	31	16/16
03	<b>840</b>	-	480	200	160	40	12	24	19	26	10/14
<i>Gutierrezia sarothrae</i>											
98	<b>1360</b>	20	420	920	20	20	0	0	1	1	6/6
03	<b>560</b>	-	-	520	40	260	0	0	7	7	5/7
<i>Juniperus osteosperma</i>											
98	<b>140</b>	20	120	20	-	40	0	0	-	0	-/-
03	<b>120</b>	-	40	80	-	-	0	0	-	0	-/-
<i>Opuntia spp.</i>											
98	<b>80</b>	-	-	40	40	20	0	0	50	0	4/7
03	<b>180</b>	-	-	120	60	-	0	0	33	33	5/16
<i>Pediocactus simpsonii</i>											
98	<b>60</b>	-	-	60	-	20	0	0	0	0	3/3

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
03	<b>80</b>	-	-	60	20	-	0	0	25	25	2/2
Sclerocactus											
98	<b>20</b>	-	-	20	-	-	0	0	-	0	-/-
03	<b>80</b>	-	-	80	-	-	0	0	-	0	3/2